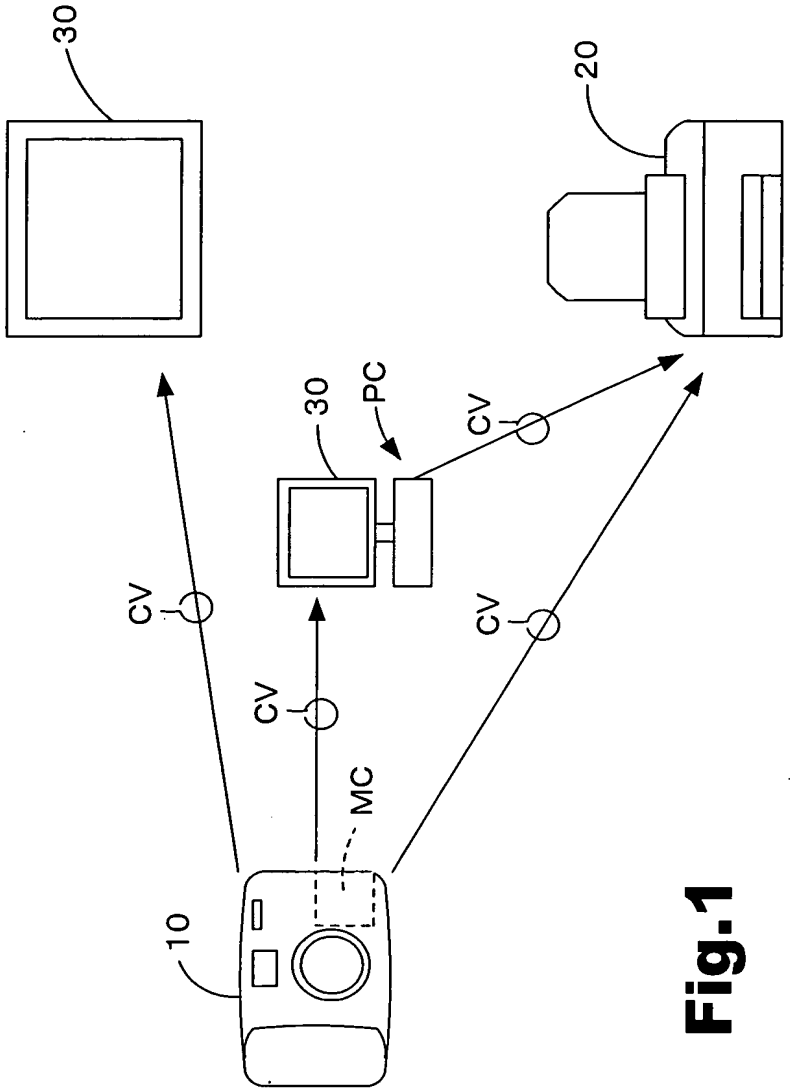


Fig.1

Fig.2

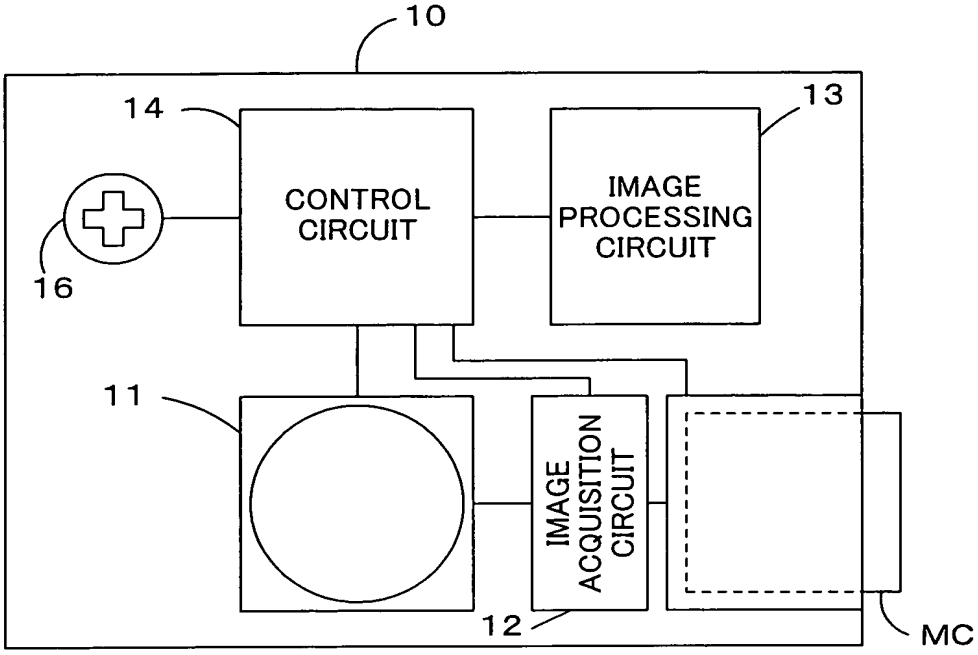

10
14
13
CONTROL CIRCUIT
IMAGE PROCESSING CIRCUIT
16
11
IMAGE ACQUISITION CIRCUIT
12
MC

Fig.3

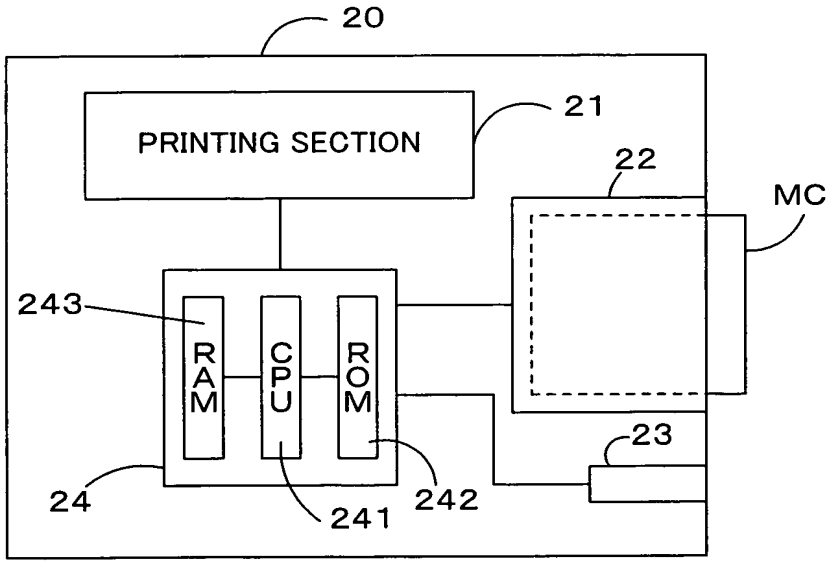

20
PRINTING SECTION
21
22
MC
243
RAM
CPU
ROM
23
24
241
242

Fig.4

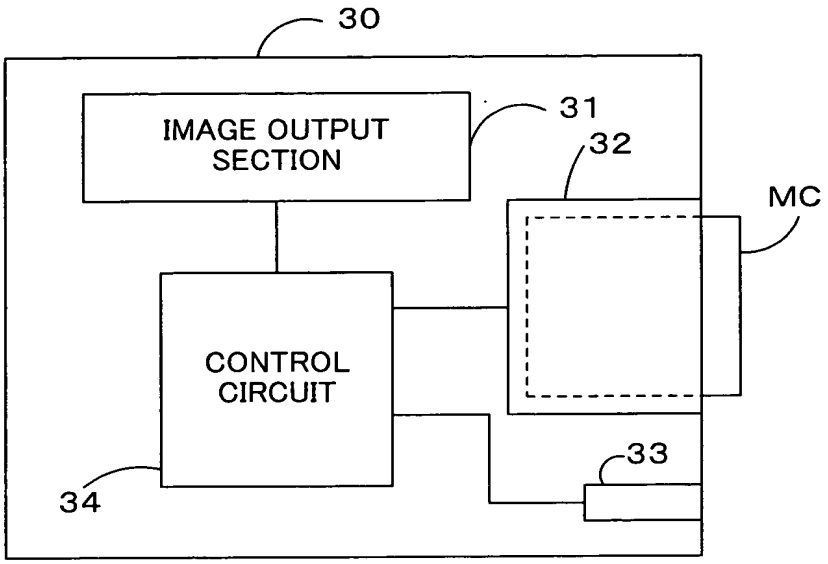


Fig.5

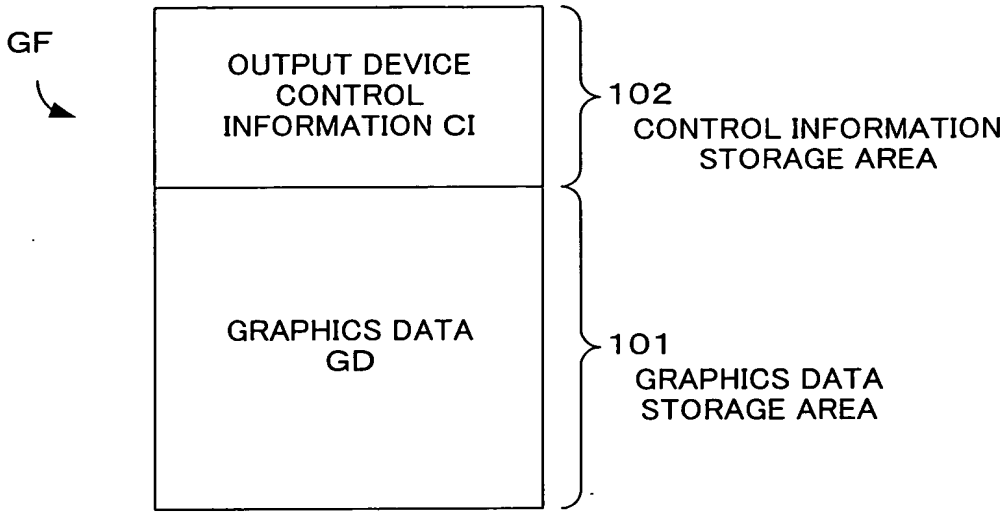

GF
OUTPUT DEVICE CONTROL INFORMATION CI
102
CONTROL INFORMATION STORAGE AREA
GRAPHICS DATA GD
101
GRAPHICS DATA STORAGE AREA

Fig.6

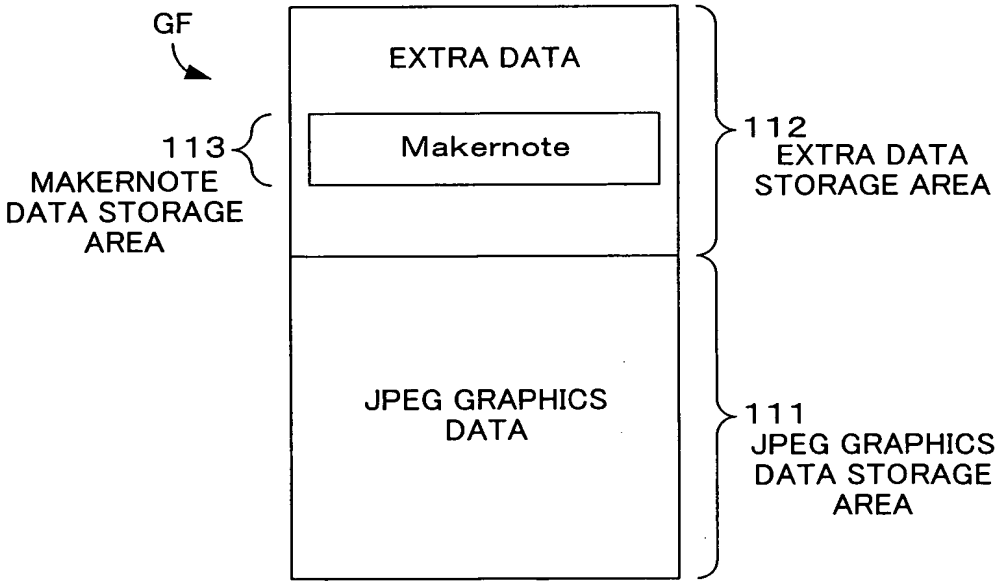

GF
EXTRA DATA
Makernote
113
MAKERNOTE DATA STORAGE AREA
112
EXTRA DATA STORAGE AREA
JPEG GRAPHICS DATA
111
JPEG GRAPHICS DATA STORAGE AREA

Fig.7

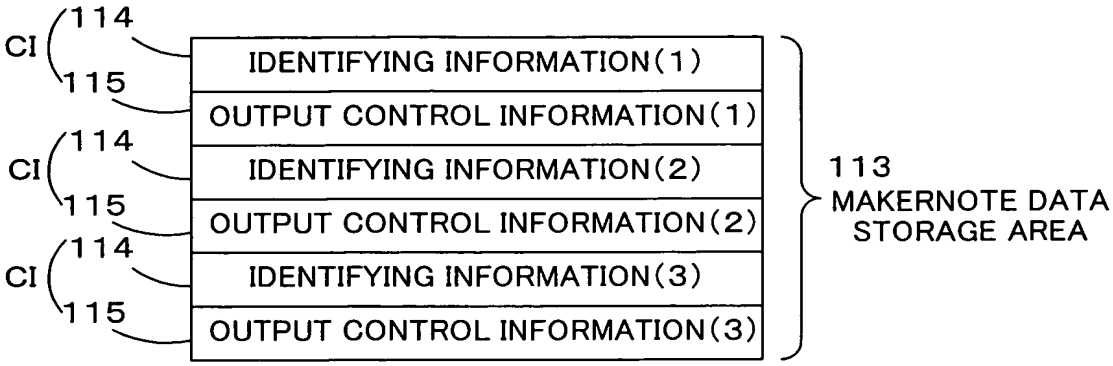
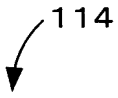


Fig.8



DESCRIPTION	SETTING
CONTROL IDENTIFICATION HIERARCHY NUMBER Nc	4
CONTROL CATEGORY IDENTIFIER C-ID1	1
CONTROL CATEGORY IDENTIFIER C-ID2	3
CONTROL CATEGORY IDENTIFIER C-ID3	2
CONTROL CATEGORY IDENTIFIER C-ID4	0

Fig.9

DEVICE ID	D-ID1	D-ID2	D-ID3	D-ID4
ID SETTING	1:PRINTER	1:ELECTROPHOTOGRAPHIC	1:CO. A	1:AAA
		2:SUBLIMATION	2:CO. B	2:BBB
		3:INK JET	3:CO. C	3:CCC
	2:MONITOR	1:CRT	1:CO. A	1:AAA
		2:TRANSMISSIVE LCD	2:CO. B	2:BBB
		3:REFLECTIVE LCD	3:CO. C	3:CCC
	3:PROJECTOR	1:LCD	1:CO. A	1:AAA
		2:DLP	2:CO. B	2:BBB

Fig.10

115

CONTROL PARAMETER	SETTING
GAMMA CORRECTION VALUE	2. 2
TARGET COLOR SPACE	NTSC
sRGB NEGATIVE VALUE TREATMENT	1 (VALID)
SHADOW	5
HIGHLIGHT	2
CONTRAST	0
BRIGHTNESS	4
RGB COLOR BALANCE	R0/G-1/B2
CHROMATICITY	0
SHARPNESS	THRESHOLD VALUE 2, APPLIED LEVEL 3
STORED COLOR CORRECTION	GREEN 0,0,0 (UNASSIGNED) SAPCE 0,0,0 (UNASSIGNED) SKIN 0,0,0 (UNASSIGNED) RED 0,0,0 (UNASSIGNED)
AUTO ADJUST	5
PAPER	3(PHOTOGRAPHIC PAPER)
RESOLUTION	4(PHOTOGRAPH)
PRINTING DIRECTION	1(ON)

Fig.11

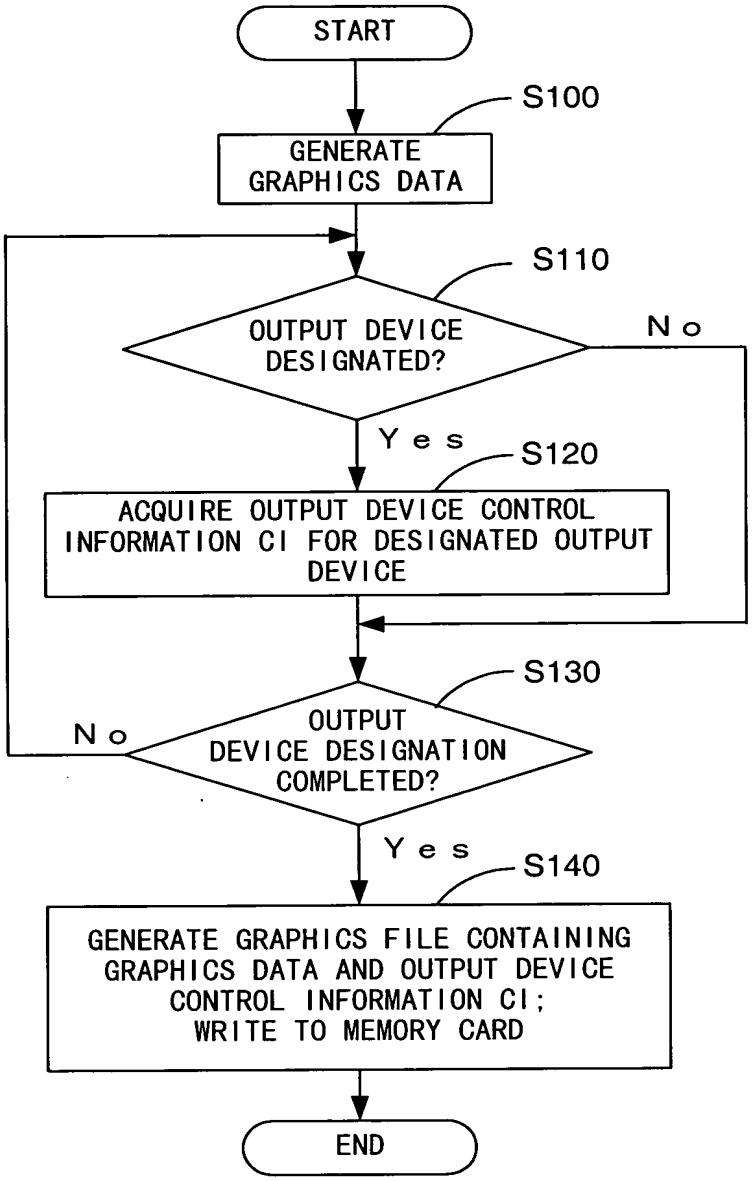

START
S100
GENERATE GRAPHICS DATA
S110
OUTPUT DEVICE DESIGNATED?
No
Yes
S120
ACQUIRE OUTPUT DEVICE CONTROL INFORMATION CI FOR DESIGNATED OUTPUT DEVICE
S130
OUTPUT DEVICE DESIGNATION COMPLETED?
No
Yes
S140
GENERATE GRAPHICS FILE CONTAINING GRAPHICS DATA AND OUTPUT DEVICE CONTROL INFORMATION CI; WRITE TO MEMORY CARD
END

Fig.12

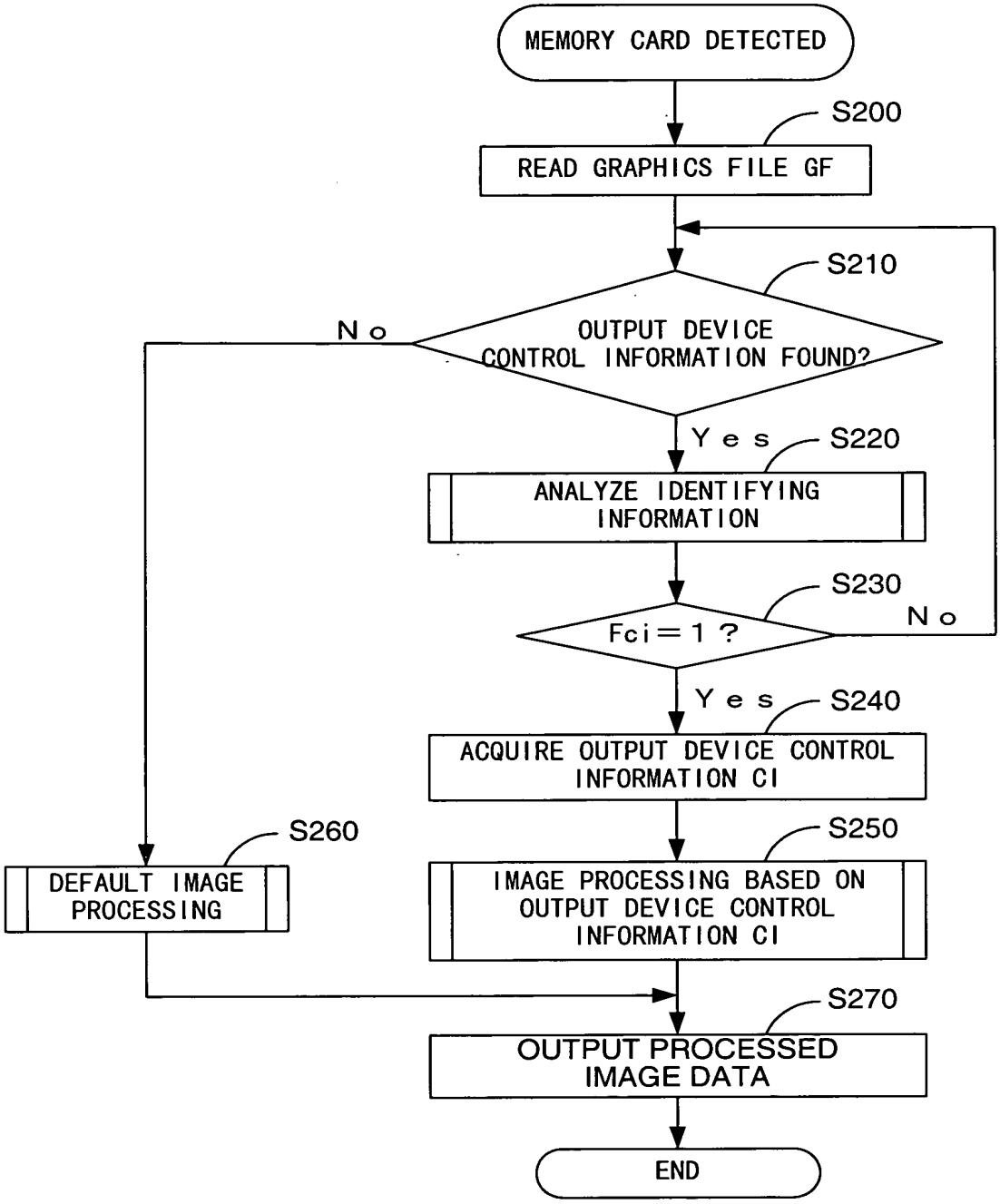

MEMORY CARD DETECTED
S200
READ GRAPHICS FILE GF
S210
OUTPUT DEVICE CONTROL INFORMATION FOUND?
No
Yes
S220
ANALYZE IDENTIFYING INFORMATION
S230
Fci=1?
No
Yes
S240
ACQUIRE OUTPUT DEVICE CONTROL INFORMATION CI
S250
IMAGE PROCESSING BASED ON OUTPUT DEVICE CONTROL INFORMATION CI
S260
DEFAULT IMAGE PROCESSING
S270
OUTPUT PROCESSED IMAGE DATA
END

Fig.13

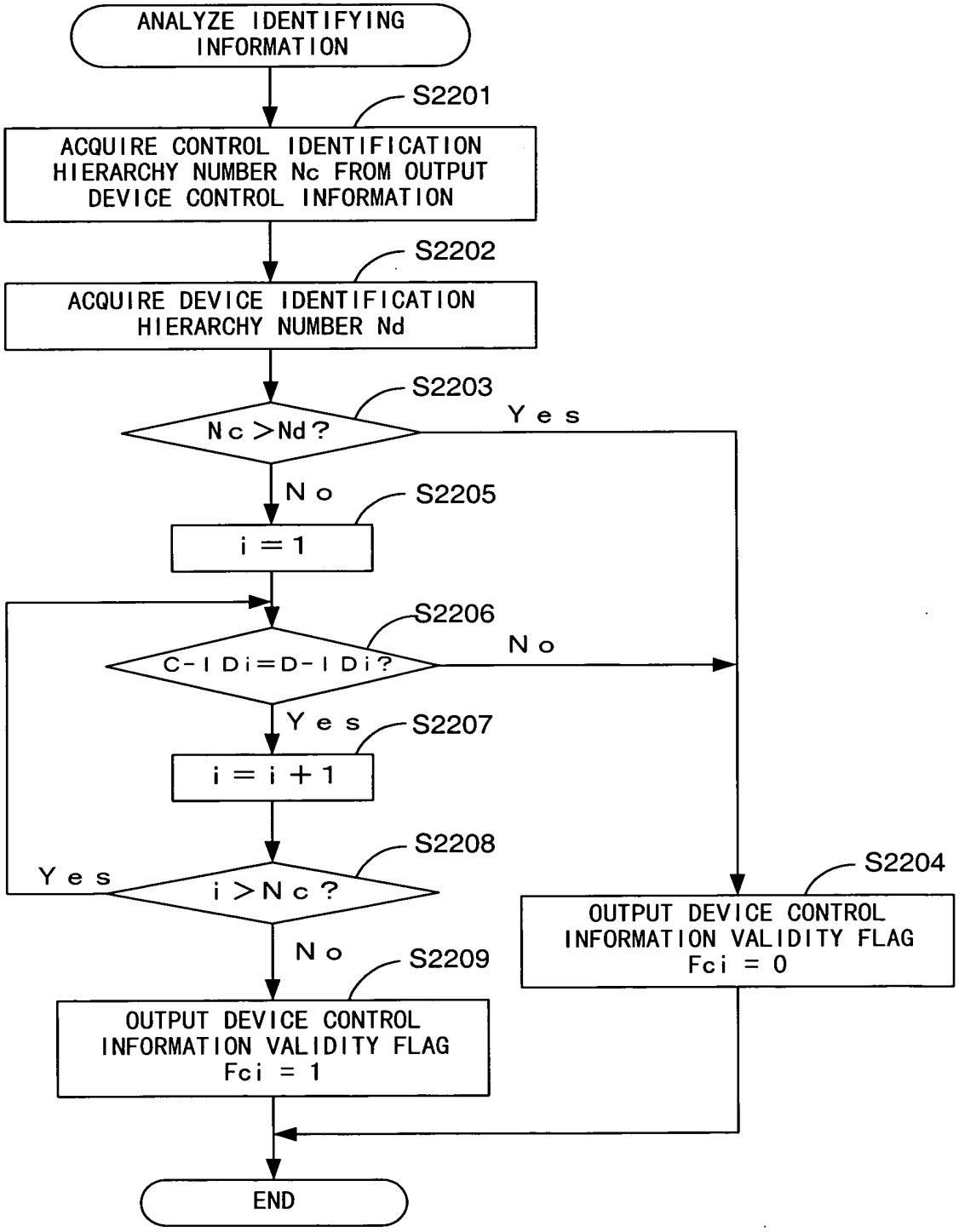

ANALYZE IDENTIFYING INFORMATION
S2201
ACQUIRE CONTROL IDENTIFICATION HIERARCHY NUMBER Nc FROM OUTPUT DEVICE CONTROL INFORMATION
S2202
ACQUIRE DEVICE IDENTIFICATION HIERARCHY NUMBER Nd
S2203
Nc>Nd?
Yes
No
S2205
i=1
S2206
C-IDi=D-IDi?
No
Yes
S2207
i=i+1
S2208
Yes
i>Nc?
No
S2209
OUTPUT DEVICE CONTROL INFORMATION VALIDITY FLAG Fci = 1
S2204
OUTPUT DEVICE CONTROL INFORMATION VALIDITY FLAG Fci = 0
END

Fig.14

DESCRIPTION	SETTING
DEVICE IDENTIFICATION HIERARCHY NUMBER Nd	4
DEVICE CATEGORY IDENTIFIER D-ID1	1
DEVICE CATEGORY IDENTIFIER D-ID2	3
DEVICE CATEGORY IDENTIFIER D-ID3	2
DEVICE CATEGORY IDENTIFIER D-ID4	0

Fig.15

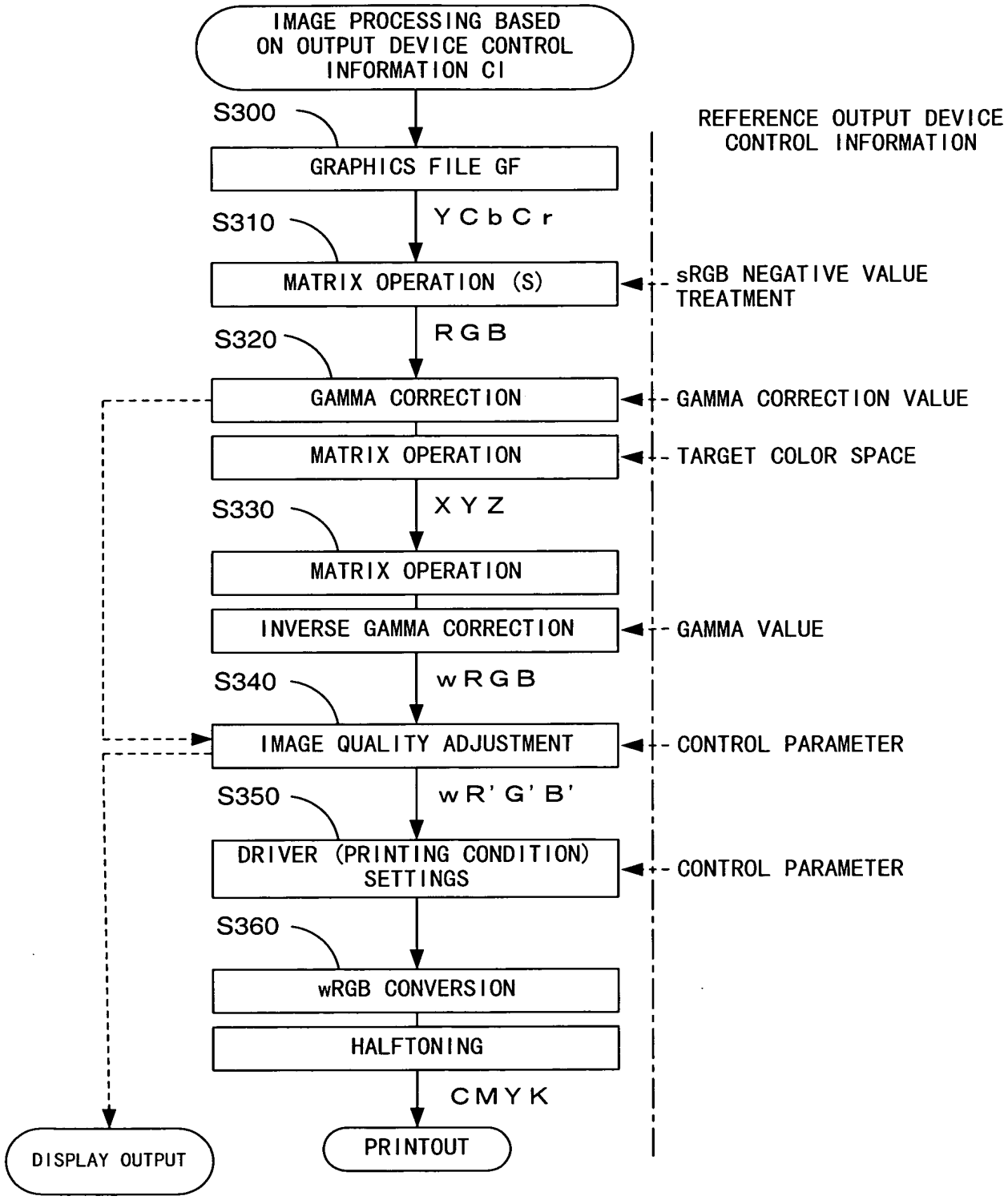


IMAGE PROCESSING BASED ON OUTPUT DEVICE CONTROL INFORMATION CI
S300
GRAPHICS FILE GF
YCbCr
S310
MATRIX OPERATION (S)
sRGB NEGATIVE VALUE TREATMENT
RGB
S320
GAMMA CORRECTION
GAMMA CORRECTION VALUE
MATRIX OPERATION
TARGET COLOR SPACE
XYZ
S330
MATRIX OPERATION
INVERSE GAMMA CORRECTION
GAMMA VALUE
wRGB
S340
IMAGE QUALITY ADJUSTMENT
CONTROL PARAMETER
wR'G'B'
S350
DRIVER (PRINTING CONDITION) SETTINGS
CONTROL PARAMETER
S360
wRGB CONVERSION
HALFTONING
CMYK
DISPLAY OUTPUT
PRINTOUT
REFERENCE OUTPUT DEVICE CONTROL INFORMATION

Fig.16

$$\begin{pmatrix} R \\ G \\ B \end{pmatrix} = S \begin{pmatrix} Y \\ Cb-128 \\ Cr-128 \end{pmatrix}$$

$$S = \begin{pmatrix} 1 & 0 & 1.40200 \\ 1 & -0.34414 & -0.71414 \\ 1 & 1.77200 & 0 \end{pmatrix}$$

Fig.17

$$\begin{pmatrix} X \\ Y \\ Z \end{pmatrix} = M \begin{pmatrix} Rt' \\ Gt' \\ Bt' \end{pmatrix} \qquad M = \begin{pmatrix} 0.6067 & 0.1736 & 0.2001 \\ 0.2988 & 0.5868 & 0.1144 \\ 0 & 0.0661 & 1.1150 \end{pmatrix}$$

$Rt, Gt, Bt \geqq 0$

$$Rt' = \left(\frac{Rt}{255}\right)^{\gamma} \qquad Gt' = \left(\frac{Gt}{255}\right)^{\gamma} \qquad Bt' = \left(\frac{Bt}{255}\right)^{\gamma}$$

$Rt, Gt, Bt < 0$

$$Rt' = -\left(\frac{-Rt}{255}\right)^{\gamma} \qquad Gt' = -\left(\frac{-Gt}{255}\right)^{\gamma} \qquad Bt' = -\left(\frac{-Bt}{255}\right)^{\gamma}$$

Fig.18

$$\begin{pmatrix} Rw \\ Gw \\ Bw \end{pmatrix} = \mathrm{N}^{-1} \begin{pmatrix} X \\ Y \\ Z \end{pmatrix}$$

$$\mathrm{N}^{-1} = \begin{pmatrix} 3.30572 & -1.77561 & 0.73649 \\ -1.04911 & 2.1694 & -1.4797 \\ 0.0658289 & -0.241078 & 1.24898 \end{pmatrix}$$

$$Rw' = \left(\frac{Rw}{255}\right)^{1/\gamma} \qquad Gw' = \left(\frac{Gw}{255}\right)^{1/\gamma} \qquad Bw' = \left(\frac{Bw}{255}\right)^{1/\gamma}$$